Washington Department of Fish and Wildlife's Priority Habitat and Species Management Recommendations Volume IV: Birds

Flammulated Owl
Otus flammeolus

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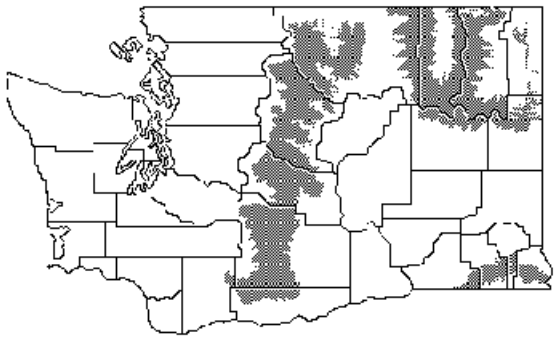
GENERAL RANGE AND WASHINGTON DISTRIBUTION

Flammulated owls are found in mountainous areas of western North America from Guatemala to Canada (American Ornithologists' Union 1983).

In Washington, they are breeding residents along the eastern slope of the Cascades, Okanogan Highlands and Blue Mountains. (Smith et al. 1997).



General range of flammulated owl, *Otus flammeolus*, in Washington. Map derived from GAP analysis of Washington (Smith et al. 1997).

RATIONALE

The flammulated owl is a State Candidate species. Limited research on the flammulated owl indicates that its demography and life history, coupled with narrow habitat requirements, make it vulnerable to habitat changes. The mature and older forest stands that are used as breeding habitat by the flammulated owl have changed during the past century due to fire management and timber harvest.

HABITAT REQUIREMENTS

Flammulated owls are typically found in mid-elevation coniferous forests containing mature to old, open canopy yellow pine (ponderosa pine [*Pinus ponderosa*] and Jeffrey pine [*Pinus jeffreyi*]), Douglas fir (*Pseudotsuga menziesii*), and grand fir (*Abies grandis*) (Bull and Anderson 1978, Goggans 1986, Howie and Ritchie 1987, Reynolds and Linkhart 1992, Powers et al. 1996). In central Colorado, Linkhart and Reynolds (1997) reported that 60% of the habitat within the area defended by territorial males consisted of old (200-400 year) ponderosa pine/Douglas-fir forest. Territories most consistently occupied by breeding pairs (>12 years) contained the greatest (>75%) amount of old ponderosa pine/Douglas-fir forest. Marcot and Hill (1980) reported that California black oak (*Quercus kellogii*) and ponderosa pine occurred in 67% and 50%, respectively, of the flammulated owl nesting territories they studied in northern California. In northeastern Oregon, Bull and Anderson (1978) noted that ponderosa pine was an overstory species in 73% of flammulated owl nest sites. Powers et al. (1996) reported that ponderosa pine was absent from their flammulated owl study site in Idaho and that Douglas-fir and quaking aspen (*Populus tremuloides*) accounted for all nest trees.

The owls nest primarily in cavities excavated by flickers (*Colates* spp.), hairy woodpeckers (*Picoides villosus*), pileated woodpeckers (*Dryocopus pileatus*), and sapsuckers (*Sphyrapicus* spp.) (Bull et al. 1990, Goggans 1986, McCallum 1994). Bull et al. (1990) found that flammulated owls used pileated woodpecker cavities with a greater frequency than would be expected based upon available woodpecker cavities. There are only a few reports of this owl using nest boxes (Bloom 1983). Reynolds and Linkhart (1987) reported occupancy in 2 of 17 nest boxes put out for flammulated owls.

In studies from northeastern Oregon and south central Idaho, nest sites were located 5-16 m (16-52 ft) high in dead wood of live trees, or in snags with an average diameter at breast height (dbh) of >50 cm (20 in) (Goggans 1986, Bull et al. 1990, Powers et al. 1996). Most nests were located in snags. Bull et al. (1990) found that stands containing trees greater than 50 cm (20 in) dbh were used more often than randomly selected stands. Reynolds and Linkhart (1987) suggested that stands with trees >50 cm (20 in) were preferred because they provided better habitat for foraging due to the open nature of the stands, allowing the birds access to the ground and tree crowns. Some stands containing larger trees also allow more light to the ground that produces ground vegetation, serving as food for insects preyed upon by owls (Bull et al. 1990).

Both slope position and slope aspect have been found to be important indicators of flammulated owl nest sites (Goggans 1986, Bull et al. 1990). In general, ridges and the upper third of slopes were used more than lower slopes and draws (Bull et al. 1990). It has been speculated that ridges and upper slopes may be preferred because they provide gentle slopes, minimizing energy expenditure for carrying prey to nests. Prey may also be more abundant or at least more active on higher slopes because these areas are warmer than lower ones (Bull et al. 1990).

Breeding occurs in mature to old coniferous forests from late April through early October. Nests typically are not found until June (Bull et al. 1990). The peak nesting period is from mid-June to

mid-July (Bent 1961). Mean hatching and fledging dates in Idaho were 26 June and 18 July, respectively (Powers et al. 1996).

In Oregon, individual home ranges averaged about 10 ha (25 ac) (Goggans 1986). Territories are typically found in core areas of mature timber with two canopy layers present (Marcot and Hill 1980). The uppermost canopy layer is formed by trees at least 200 years old. Core areas are near, or adjacent to clearings of 10-80% brush cover (Bull and Anderson 1978, Marcot and Hill 1980). Linkhart and Reynolds (1997) found that flammulated owls occupying stands of dense forest were less successful that owls whose territories contain open, old pine/fir forests.

Day roosts are located in mature mixed conifer stands with dense, multi-layered canopies (Bull and Anderson 1978, Goggans 1986). Dense stands presumably provide cover from weather and predators, and they may form core areas of the owls' territories.

Flammulated owls are presumed to be migratory in the northern part of their range (Balda et al. 1975), and winter migrants may extend to neotropical areas in central America. In Oregon, they arrive at the breeding sites in early May and begin nesting in early June; young fledge in July and August (Goggans 1986; E. Bull, personal communication). In Colorado, owlets dispersed in late August and the adults in early October (Reynolds and Linkhart 1987).

Flammulated owls are entirely insectivores; nocturnal moths are especially important during spring and early summer (Reynolds and Linkhart 1987). As summer progresses and other prey become available, lepidopteran larvae, grasshoppers, spiders, crickets, and beetles are added to the diet (Johnson 1963, Goggans 1986). In Colorado, foraging occurred primarily in old ponderosa pine and Douglas-fir with an average tree age of approximately 200 years (Reynolds and Linkhart 1992). Old growth ponderosa pine were selected for foraging, and young Douglas-firs were avoided. Flammulated owls principally forage for prey on the needles and bark of large trees. They also forage in the air, on the ground, and along the edges of clearings (Goggans 1986; E. Bull, personal communication; R. Reynolds, personal communication). Grasslands in and adjacent to forest stands are thought to be important foraging sites (Goggans 1986). However, Reynolds (personal communication) suggests that ground foraging is only important from the middle to late part of the breeding season, and its importance may vary annually depending upon the abundance of ground prey. Ponderosa pine and Douglas-fir were the only trees selected for territorial singing in male defended territories in Colorado (Reynolds and Linkhart 1992).

LIMITING FACTORS

Availability of suitable nest cavities and/or arthropod prey in ponderosa pine or mixed conifer forests are likely limiting. Reasons for the apparent narrow elevation range exhibited by flammulated owls are not known, but reasons are likely related to food and ecological tolerances (R. Reynolds, personal communication).

MANAGEMENT RECOMMENDATIONS

Creation of large areas of even-aged timber is likely detrimental to flammulated owls. Uneven stands of open mature and old timber located near brushy clearings provide good habitat for flammulated owls. The selection for mature to old-growth ponderosa pine/Douglas-fir forests in areas where owls have been studied throughout the west indicates that this habitat may also be important in Washington. Marcot and Hill (1980) noted the potential importance of old black oak trees to flammulated owls in California because of their numerous natural cavities. Washington's white oak/conifer forests should be surveyed for these owls.

All conifers and hardwoods having natural or excavated cavities in and adjacent to flammulated owl territories should be left undisturbed (Marcot and Hill 1980). Bull et al. (1990) suggests leaving large snags and trees (>50 cm [20 in] dbh and 6 m [20 ft] tall) along ridge-tops, and south and east facing slopes in ponderosa pine/Douglas-fir or grand fir forest types. Reynolds (personal communication) recommends leaving at least 5 snags/ha (2/ac) in ponderosa pine habitat.

Future nest snags should be recruited by continually retaining large, mature trees in or adjacent to suitable flammulated owl habitat (Marcot and Hill 1980). Where snags are lacking, large trees can be topped to promote woodpecker use and cavity formation. Fuelwood collection should be limited where flammulated owls occur because this practice eliminates nest snags.

Areas with brushy understory vegetation may provide insect prey and feeding cover when flammulated owls forage near the ground. Therefore, forest practices (e.g., application of herbicide) that remove brush from clearings adjacent to flammulated owl territories should be avoided. Application of insecticides that affect the owl's prey species should not occur within close proximity to flammulated owl home range areas, approximately 305 m (1,000 ft) from the nest. If insecticide or herbicide use is planned for areas where this species occurs, review Appendix A for contacts to assist in assessing the use of chemicals and their alternatives.

REFERENCES

American Ornithologists' Union. 1983. Checklist of North American birds. Sixth edition. American Ornithologists' Union, Baltimore, Maryland, USA.

Balda, R. P., B. C. McKnight, and C. D. Johnson. 1975. Flammulated owl migration in the southwestern United States. Wilson Bulletin 87:520-530.

Bent, A. C. 1961. Life histories of North American birds of prey. Dover Publishing, Incorporated, New York, New York, USA.

Bloom, P. H. 1983. Notes on the distribution and biology of the flammulated owl in California. Western Birds 14:49-52.

Bull, E. L., and R. G. Anderson. 1978. Notes on flammulated owls in northeastern Oregon. Murrelet 59:26-28.

)))))), Wright, A. L., and M.G. Henjum. 1990. Nesting habitat of flammulated owls in Oregon. Journal of Raptor Research 24:52-55.

Goggans, R. 1986. Habitat use by flammulated owls in northeastern Oregon. Thesis, Oregon State University, Corvallis, Oregon, USA.

Howie, R. R., and R. Ritcey. 1987. Distribution, habitat selection, and densities of flammulated owls in British Columbia. Pages 249-254 *in* R. W. Nero, R. J. Clark, R. J. Knapton, and R. H. Hamre, editors. Biology and conservation of northern forest owls. USDA Forest Service General Technical Report RM-142.

Johnson, N. K. 1963. The supposed migratory status of the flammulated owl. Wilson Bulletin 75:174-178.

Linkhart, B. D., and R. T. Reynolds. 1997. Territories of flammulated owls: is occupancy a measure of habitat quality? Pages 250-254 *in* J. R. Duncan, D. H. Johnson, and T. H. Nicholls, editors. Biology and conservation of owls of the northern hemisphere: second international symposium. USDA Forest Service General Technical Report NC-190.

Marcot B. G., and R. Hill. 1980. Flammulated owls in northwestern California. Western Birds 11:141-149.

McCallum, D. A. 1994. Review of technical knowledge: flammulated owls. Pages 14-46 *in* G. D. Hayward and J. Verner, technical editors. Flammulated, boreal, and great gray owls in the United States: A technical conservation assessment. USDA Forest Service General Technical Report RM-253.

Powers, L. R., A. Dale, P. A. Gaede, C. Rodes, L. Nelson, J. J. Dean, and J. D. May. 1996. Nesting and food habits of the flammulated owl (*Otus flammeolus*) in southcentral Idaho. Journal of Raptor Research 30:15-20.

Reynolds, R. T., and B. D. Linkhart. 1987. The nesting biology of flammulated owls in Colorado. Pages 239-248 *in* R. W. Nero, R. J. Clark, R. J. Knapton, and R. H. Hamre, editors. Biology and conservation of northern forest owls. USDA Forest Service General Technical Report RM-142.

)))))), and)))))). 1992. Flammulated owl in ponderosa pine: evidence of preference for old growth. Pages 166-169 *in* M.R. Kaufman, W.H. Moir, and R.L. Bassett, technical coordinators. Proceedings of the workshop on old-growth in the Southwest and Rocky Mountain Region. Portal, Arizona, USA.

Smith, M. R., P. W. Mattocks, Jr., and K. M. Cassidy. 1997. Breeding birds of Washington state. Volume 4 *in* K. M. Cassidy, C. E. Grue, M. R. Smith, and K. M. Dvornich, editors. Washington GAP Analysis - Final Report Seattle Audubon Society Publication in Zoology Number 1, Seattle, Washington, USA.

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KEY POINTS

Habitat Requirements

- Associated with mid-elevation coniferous forest.
- Nest and roost in mature and old, multi-storied stands.
- Nest in cavities.
- Insectivorous, forage in open areas.

Management Recommendations

- Maintain stands of open, mature timber near brushy clearings.
- Retain all trees with cavities in or adjacent to flammulated owl territories.
- Maintain at least 5 snags/ha (2/ac) >50 cm (20 in) dbh and >6 m (20 ft) tall in ponderosa pine forests.
- Ensure snag recruitment by retaining large, mature trees in or adjacent to flammulated owl habitat.
- Where snags are lacking, top large trees to promote woodpecker use and cavity formation.
- Limit fuelwood collection where flammulated owls occur.
- Leave brush in clearings near owl territories.
- Do not apply insecticides or herbicides in areas used by owls.